POSTER DESCRIPTION SHEET

Title: Multi-Attribute Tradespace Exploration as an Enabler of Architecting an Extensible On-Orbit Servicing System

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Summary Description: On-orbit servicing refers to a variety of functions that can extend the useful life of spacecraft including the inspection, refueling, upgrading, repair, and relocation of target satellites. This research applies Multi-Attribute Tradespace Exploration (MATE) – an innovative conceptual design process for applying decision theory to model and simulation-based design – to the concept generation and selection of a commercially-viable on-orbit servicing architecture. In exploring extensible system-of-system architectures, this research aims to provide insights into product designs that are flexible to dynamic stakeholder utility, capable of adapting to changes in threats and environment, and economically sustainable.

Key Points:

1) Work motivated by need for robust, flexible space systems and need for design methodology to enable multi-stakeholder spiral development.
2) A MATE study of on-orbit servicing – a means to extend satellite lifetimes or correct the orbits of stranded satellites – is being conducted to address both of these needs.
3) As a rapid tradespace enumeration tool with the flexibility to incorporate "lessons learned" from previous spirals, MATE empowers product designers to explore a multidimensional pareto-efficient surface of designs.

Linkage with Research: Systems Architecting, Product Design, Lifecycle Sustainability, Emerging Systems Engineering Methodologies